NEL 10Gbps 16bit Multiplexer

NLB9258A

Product Data Sheet

1. Description

1) The NLB9258A(MUX-LSI) multiplexes 16 parallel input signals (up to 622Mb/s) to a single serial output signal (up to10Gb/s) . The NLB9258A has function of a phase comparator.

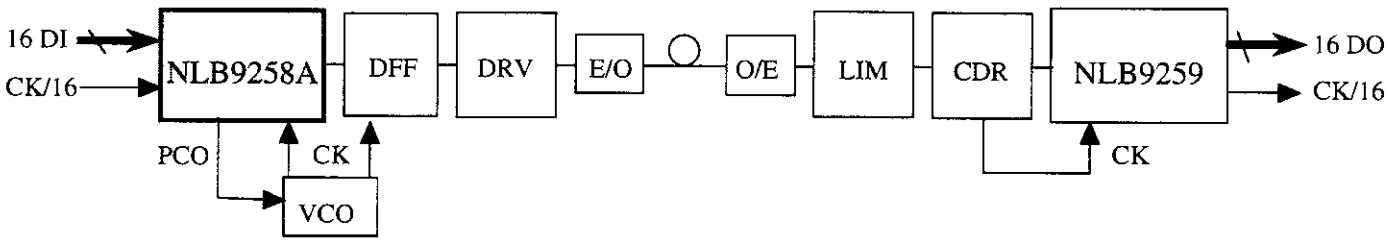
2. Features and Applications

Features

1) Performs 16:1 mux
2) 10Gb/s signal level interface : SCFL
3) 622Mb/s signal level interface : ECL
4) Standard -2.0V and -5.2V power supplies

Applications

1) STM-64 transmission system



VCO: Voltage Controlled Oscillator
DRV: Driver
LIM: Limitter amplifier
CDR: Clock Data Recovery

2) High-speed test equipments for STM-64 transmission system

All specifications described here are subject to change without notice.

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3. Function

3.1 Block diagram

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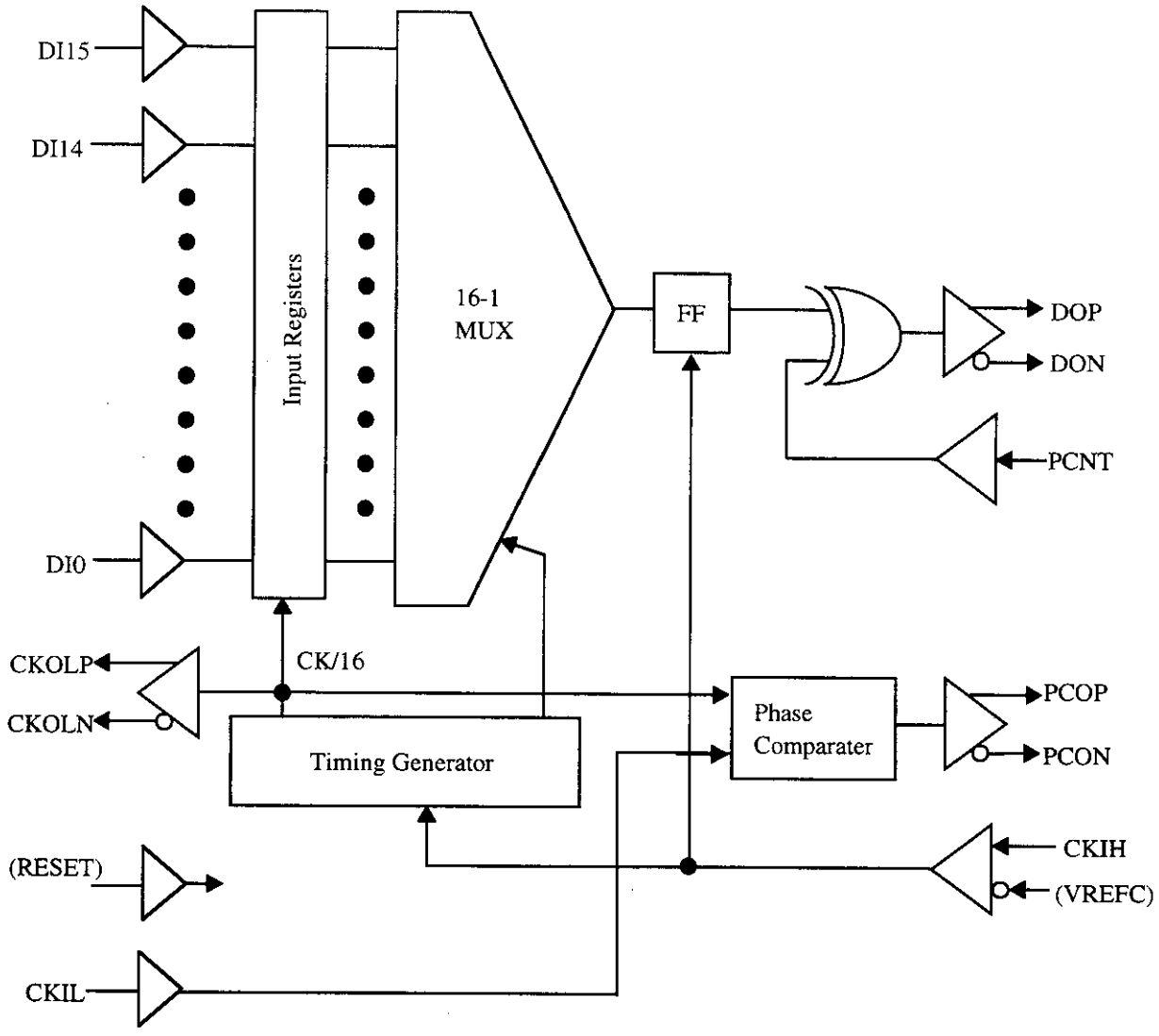

Fig.1 block diagram

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3.2 Pin description

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MUX	Pin name	I/O	Function	Interface
Main Signals	DIn(n=15~0)	I	622Mb/s data	ECL(S), internal 50Ω to VTT
	CKIH/(VREFC)		10GHz clock	SCFL(S)/internal VREFC with a monitor pad
	DOP/DON	O	10Gb/s data	SCFL(D)
	CKOLP/CKOLN		622MHz clock	ECL(D)
Other Signals	CKIL	I	622MHz clock	ECL(S), internal 50Ω to VTT
	PCNT		Data output polarity control (input=H: Invert)	DC ECL(S)/internal 50Ω to VTT
	(RESET)		Reset for test (Normally open)	DC ECL(S)/internal 50Ω to VTT
	PCOP/PCON	O	622MHz clock phase comparison	SCFL(D)

NOTE:

(S): Single ended

(D): Differential

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3.3 Pin Connection Diagram (Top View)

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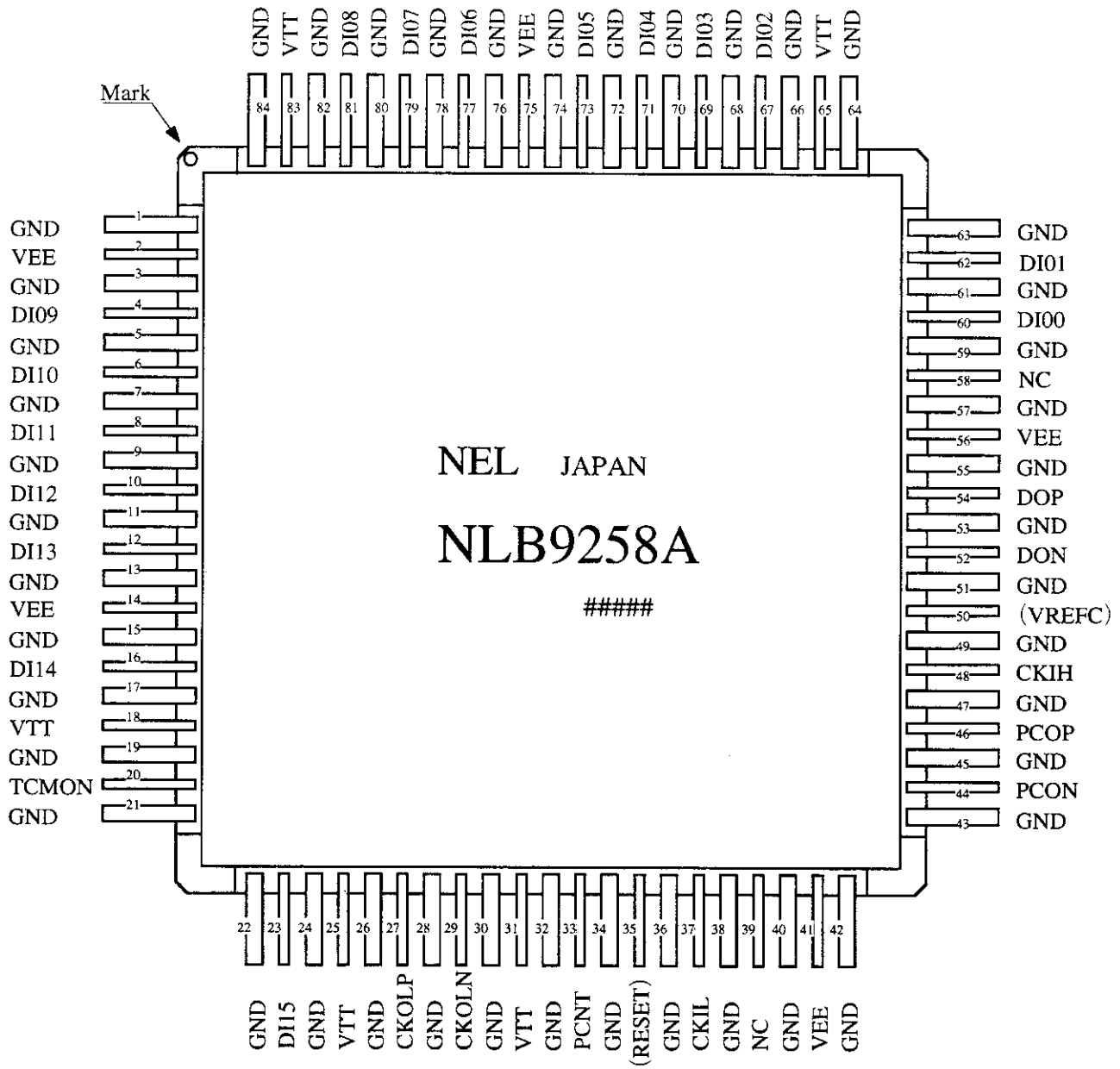

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3.4 Pin connection table

No.	NAME	FUNCTION	No.	NAME	FUNCTION
1	GND	Ground (0.0V)	43	GND	Ground (0.0V)
2	VEE	VEE Power Supply (-5.2V)	44	PCON	Phase Comparison Output (Comp.)
3	GND	Ground (0.0V)	45	GND	Ground (0.0V)
4	DI09	1/16 Data Input	46	PCOP	Phase Comparison Output (True)
5	GND	Ground (0.0V)	47	GND	Ground (0.0V)
6	DI10	1/16 Data Input	48	CKIH	High Speed Clock Input
7	GND	Ground (0.0V)	49	GND	Ground (0.0V)
8	DI11	1/16 Data Input	50	(VREFC)	High Speed Clock Input Vref.
9	GND	Ground (0.0V)	51	GND	Ground (0.0V)
10	DI12	1/16 Data Input	52	DON	High Speed Data Output (Comp.)
11	GND	Ground (0.0V)	53	GND	Ground (0.0V)
12	DI13	1/16 Data Input	54	DOP	High Speed Data Output (True)
13	GND	Ground (0.0V)	55	GND	Ground (0.0V)
14	VEE	VEE Power Supply (-5.2V)	56	VEE	VEE Power Supply (-5.2V)
15	GND	Ground (0.0V)	57	GND	Ground (0.0V)
16	DI14	1/16 Data Input	58	NC	No internal Connection
17	GND	Ground (0.0V)	59	GND	Ground (0.0V)
18	VTT	VTT Power Supply (-2.0V)	60	DI00	1/16 Data Input
19	GND	Ground (0.0V)	61	GND	Ground (0.0V)
20	TCMON	Case Temperature Monitor	62	DI01	1/16 Data Input
21	GND	Ground (0.0V)	63	GND	Ground (0.0V)
22	GND	Ground (0.0V)	64	GND	Ground (0.0V)
23	DI15	1/16 Data Input	65	VTT	VTT Power Supply (-2.0V)
24	GND	Ground (0.0V)	66	GND	Ground (0.0V)
25	VTT	VTT Power Supply (-2.0V)	67	DI02	1/16 Data Input
26	GND	Ground (0.0V)	68	GND	Ground (0.0V)
27	CKOLP	1/16 Clock Output (True)	69	DI03	1/16 Data Input
28	GND	Ground (0.0V)	70	GND	Ground (0.0V)
29	CKOLN	1/16 Clock Output (Comp.)	71	DI04	1/16 Data Input
30	GND	Ground (0.0V)	72	GND	Ground (0.0V)
31	VTT	VTT Power Supply (-2.0V)	73	DI05	1/16 Data Input
32	GND	Ground (0.0V)	74	GND	Ground (0.0V)
33	PCNT	Data Output Polarity Control	75	VEE	VEE Power Supply (-5.2V)
34	GND	Ground (0.0V)	76	GND	Ground (0.0V)
35	(RESET)	Reset for test	77	DI06	1/16 Data Input
36	GND	Ground (0.0V)	78	GND	Ground (0.0V)
37	CKIL	1/16 Clock Input	79	DI07	1/16 Data Input
38	GND	Ground (0.0V)	80	GND	Ground (0.0V)
39	NC	No internal Connection	81	DI08	1/16 Data Input
40	GND	Ground (0.0V)	82	GND	Ground (0.0V)
41	VEE	VEE Power Supply (-5.2V)	83	VTT	VTT Power Supply (-2.0V)
42	GND	Ground (0.0V)	84	GND	Ground (0.0V)

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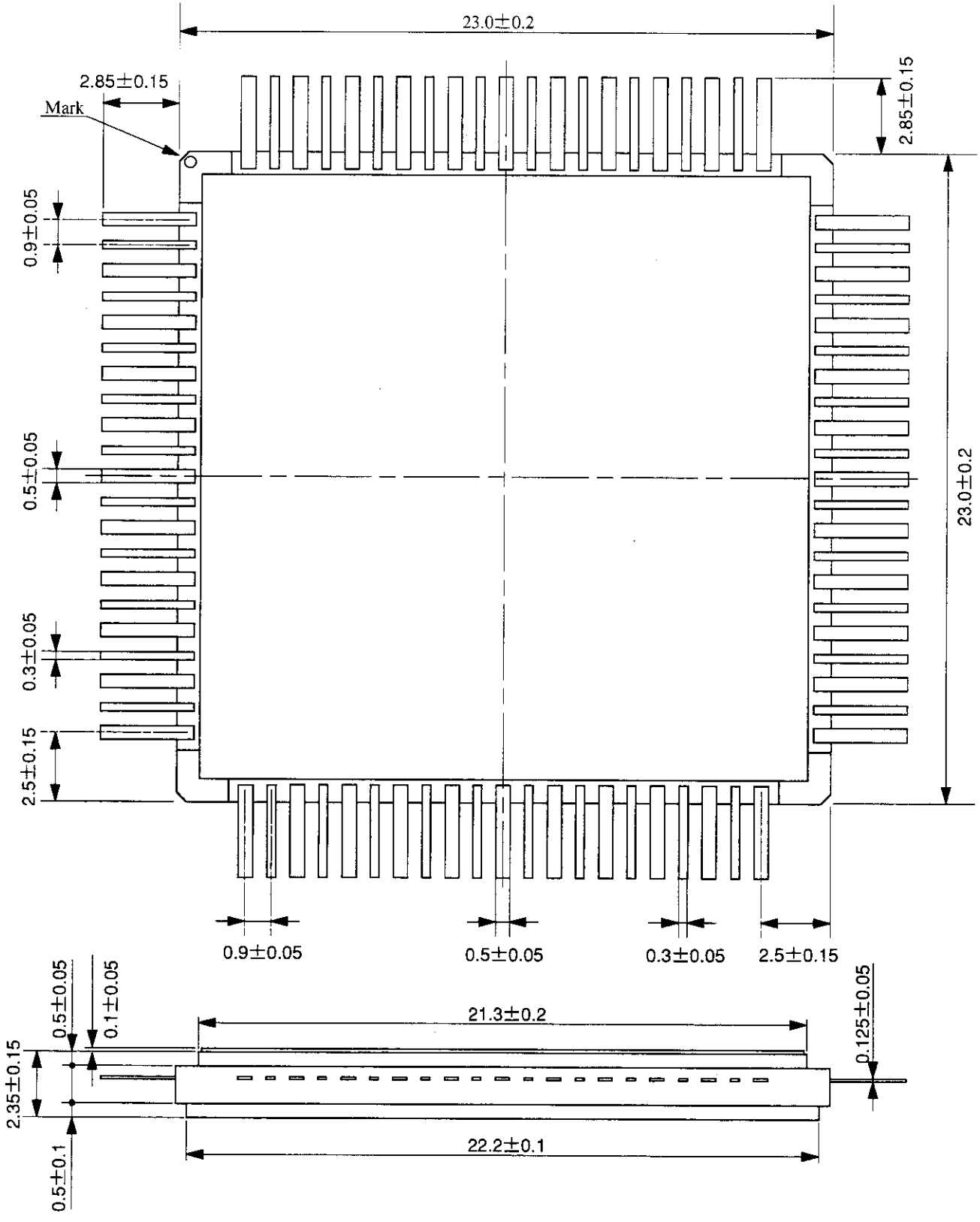
3.5 Package Dimensions (mm)

Package name: TB84



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3.6 Timing chart

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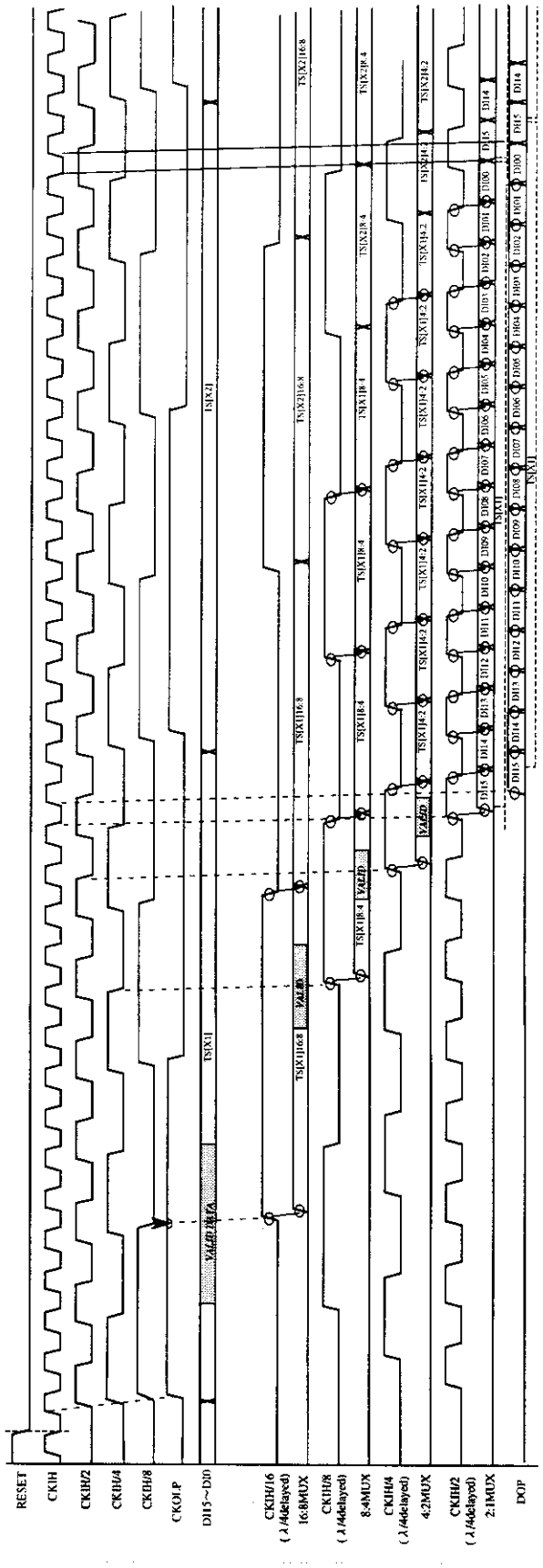

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4. Absolute maximum ratings

Parameter	Symbol	Interface	Ratings	Units
Power Supply Voltage	VEE		0.5 ~-6.0	V
Termination Voltage	VTT		0.5 ~-2.5	V
Input Voltage	Vsin	SCFL	0.3 ~-1.6	V
Input Voltage	Vrefc	SCFL	0.3 ~-1.6	V
Input Voltage	Vein	ECL	0.3 ~-2.1	V
Output Voltage	Vsout	SCFL	0.2 ~-1.75	V
Output Voltage	Veout	ECL	0.2 ~-2.5	V
Storage Temperature	Tstg		-65 ~ +150	℃
Case Temperature Under Bias	Tc		-55 ~ +125	℃

Note: Input and Output Voltages are specified at VEE=-5.2V, VTT=-2.0V. Stresses listed under "Absolute Maximum Ratings" may be applied to devices one at a time without causing permanent damage. Functionality at or above values listed is not implied. Exposure to these values for extended periods may affect device reliability.

5. Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Power Supply Voltage	VEE	-4.90	-5.20	-5.50	V
Termination Voltage	VTT		-2.00		V
Operating Temperature*	T	0		70	℃

Note: *1 Lower limit is ambient temperature and upper limit is case temperature.

All specifications described here are subject to change without notice.

6. Electrical characteristics

6.1 DC characteristics

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(Tc=0~70℃)

Parameter	Symbol	Interface	Condition	Min.	Typ.	Max.	Units
Power Dissipation	Pd		VEE=-5.2±0.3V,VTT=-2.0V	—	5.8	9.0*	W
Power Supply Current	IEE		VEE=-5.2±0.3V	—	1030	1410	mA
Termination Supply Current	ITT		VTT=-2.0V	—	210	610*	mA
Input H Voltage	VEIH	ECL	VEE=-5.2V	-1100	—	-880	mV
Input L Voltage	VEIL	ECL	VEE=-5.2V	VTT	—	-1590	mV
Output H Voltage	VEOH	ECL	VEE=-5.2V, 50Ω to -2.0V	-1100	-970	—	mV
Output L Voltage	VEOL	ECL	VEE=-5.2V, 50Ω to -2.0V	VTT	-1750	-1590	mV
Output Voltage Amplitude	VEAMP	ECL	VEE=-5.2V, 50Ω to -2.0V	600	—	—	mVpp
Input H Voltage	VSIH	SCFL	VEE=-5.2V	-250	-100	0	mV
Input L Voltage	VSIL	SCFL	VEE=-5.2V	-1000	-900	-700	mV
Output H Voltage	VSOH	SCFL	50Ω to GND	-200	-100	0	mV
Output L Voltage	VSOL	SCFL	50Ω to GND	—	-900	-750	mV
Output Voltage Amplitude	VSAMP	SCFL	50Ω to GND	700	—	—	mVpp

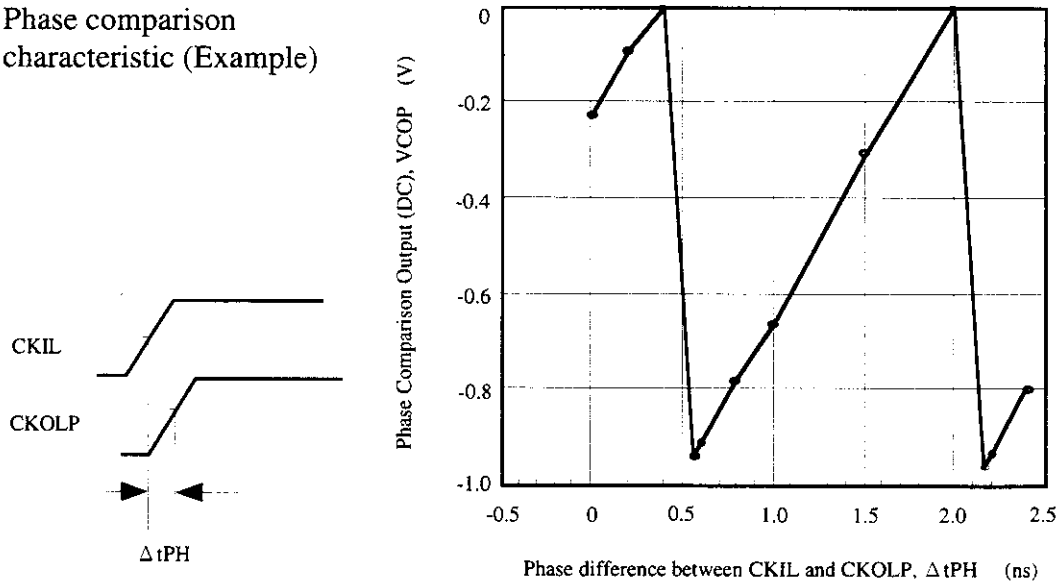
* All data inputs are High level.

Phase comparison

(VEE = -5.2V, GND = 0.0V, Tc =35℃)

Parameter	Symbol	Min.	Typ.	Max.	Units
Phase difference between CKIL and CKOLP	ΔtPH		See Fig. 2		nS
VS Comparison Output Voltage(DC)	VPCO				V

Fig.2
Phase comparison characteristic (Example)



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6.2 AC Characteristics

1) Impeadance

Parameter	Symbol	Min.	Typ.	Max.	Units
Internal Termination Resistor	Rin	40	50	60	Ω
External Termination Resistor	Rout	45	50	55	Ω

2) Timing Characteristics

(VEE = -5.2V, VTT = -2.0V, GND = 0.0V, Rout = 50Ω to GND, Tc=0～70℃)

VIH=-0.1V ,VIL=-0.85V ,PRBS 2^{31} -1 ,Mark Ratio=1/2, Error Ratio<10^{-11}

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Delay Time	tpd	CKIH to DOP, 9.95328GHz	330	410	540	ps
Minimum Setup Time	ts	DIn to CKOLP, 622MHz		820	1000	ps
Minimum Hold Time	th	CKOLP to DIn, 622MHz		-300	-130	ps
Phase Margin	phm	CKIH, 9.95328GHz	730	1080		ps
Output Rise Time	tr	DOP, 9.95328Gb/s, 20-80%		40	60	ps
Output Fall Time	tf	DOP, 9.95328Gb/s, 20-80%		40	60	ps
Output Rise Time	trc	CKOLn, 622Mb/s, 20-80%		200	300	ps
Output Fall Time	tfc	CKOLn, 622Mb/s, 20-80%		200	300	ps
Operating Frequency	fop	CKIH	9.95308	9.95328	9.95348	GHz

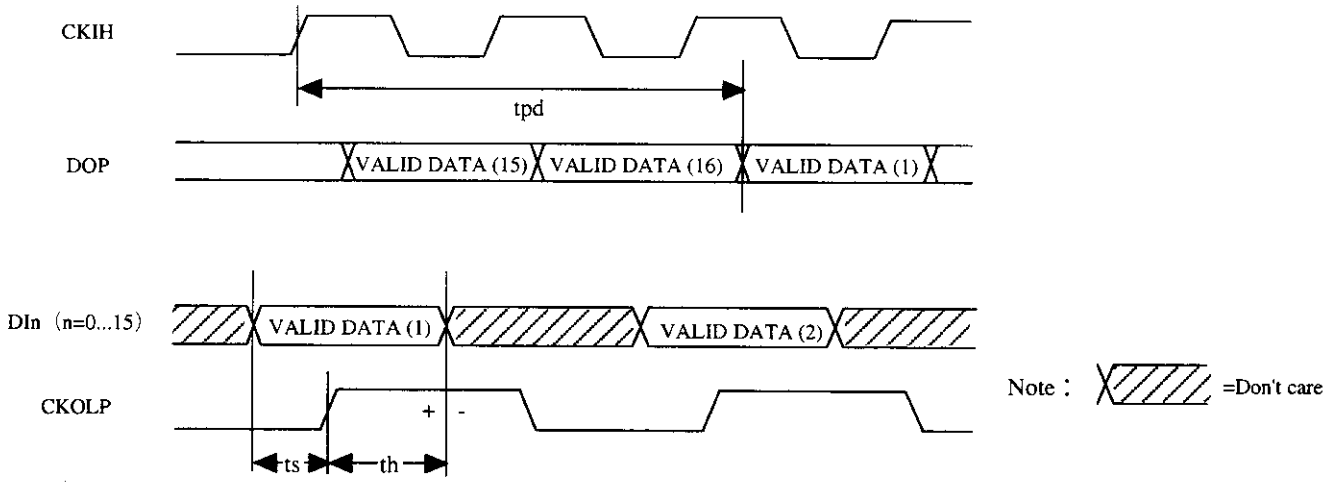

Fig.4
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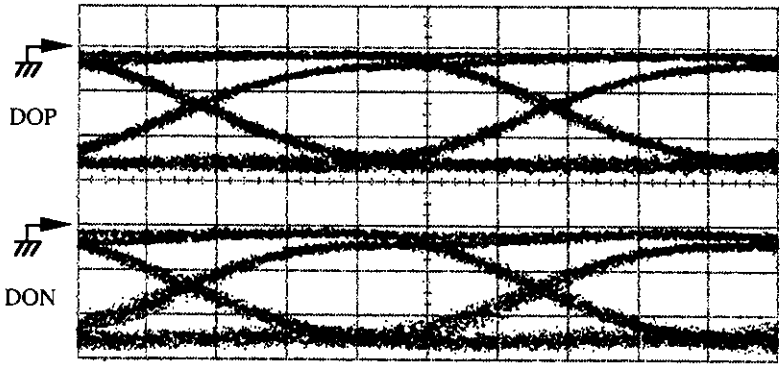
Output Waveforms (Example)



V : 400 mV / div. H : 20 ps / div.

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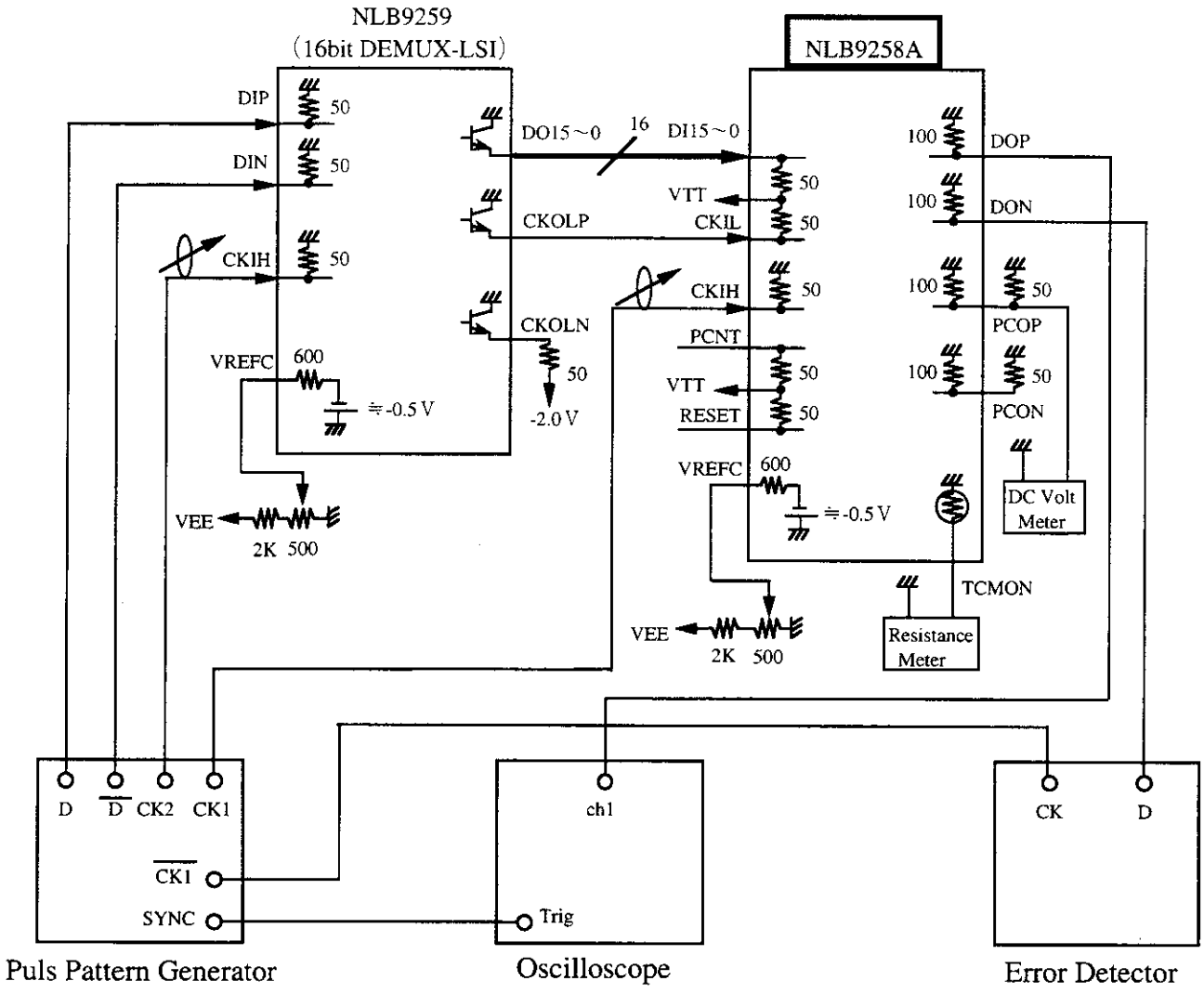
6.3 Typical Test Configuration



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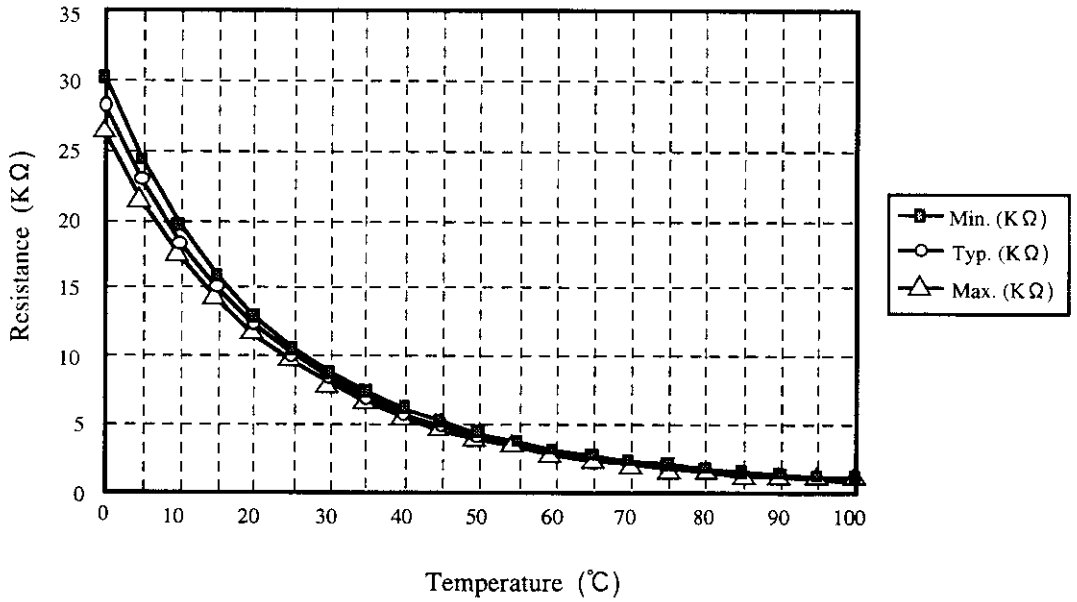
7. Temperature monitor

TCMON Resistance Value Versus Case Temperature

Temperature (℃)	Resistance(KΩ)			Temperature (℃)	Resistance(KΩ)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
0	26.11	28.08	30.12	55	3.221	3.464	3.716
5	21.07	22.56	24.09	60	2.734	2.950	3.175
10	17.11	18.24	19.39	65	2.331	2.523	2.724
15	13.98	14.84	15.71	70	1.995	2.166	2.345
20	11.49	12.15	12.81	75	1.715	1.867	2.027
25	9.500	10.00	10.50	80	1.479	1.615	1.759
30	7.833	8.277	8.725	85	1.281	1.402	1.531
35	6.493	6.887	7.286	90	1.113	1.221	1.337
40	5.410	5.759	6.115	95	0.9700	1.068	1.172
45	4.530	4.839	5.157	100	0.8484	0.9362	1.030
50	3.811	4.085	4.368				



8. Important handling precautions

BEFORE USING THE IC, PLEASE READ THIS HANDLING INSTRUCTION IN ORDER TO PREVENT POSSIBLE DAMAGE FROM VARIOUS ELECTRIC SURGES SUCH AS POWER LINE LEAKAGE AND ELECTRIC STATIC DISCHARGE.

1. Determine the standard GND at the work bench. Standard GND should be connected to the highest quality GND in the room. Connect in common all of GND terminals of all equipment to the standard GND at the work bench. Work bench should be conductive and should be connected to the standard GND. Connection cables are recommended to be as short and as thick as possible.
2. Make sure to wear a conductive wrist-strap which should be connected to the standard GND on the work bench through a 1M-ohm resistor.
3. Make sure to confirm the voltage potentials of all surrounding materials including persons which may contact the IC with oscilloscope (Do not use a DC or AC volt meter.)
4. Make certain the power supply does not generate abnormal voltage spikes.

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CAUTION

1. In order to improve products and technology, specifications are subject to change without notice.
2. When using the products, be sure the latest information and specifications are used.
3. Circuit drawings etc. shall be provided for the purpose of information only on application examples not for actual installation of equipment. NTT Electronics Corp. shall not assume any liability for damage that may result from the use of these circuit drawings etc. NTT Electronics Corp. shall not assent to or guarantee any rights of execution for patent rights of the third parties and other rights that may be raised for use of these circuit drawings.
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7. Some of the products are classified as strategic materials and the 'Foreign Exchange and Foreign Trade Control Act' applies. Export of the applicable products necessitates obtaining approval from the Japanese Government as required by law.
8. Any questions should be directed to the Sales Department of NTT Electronics Corp.

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